

# Frequency of Extractions in Various Skeletal Patterns in Orthodontic Nishtar Institute of Dentistry, Multan

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## ABSTRACT

**Introduction:** When the 20th century started Orthodontics was first recognized as a science. The removal or extraction of teeth destroys the ideal esthetics and occlusion, which was the base of orthodontic treatment plans. Edward Hartley Angle and his followers were not supporters of extraction due to this reason<sup>1</sup>. Extreme dental or maxillary protrusion leading to facial deformities could be corrected by dental extraction was supported by Calvin Case who was a strong opponent of the Angle., for mainly analyzing the frequency of use of orthodontic extractions after evaluating the changes in the use of extraction in past years. The frequency of extractions was examined in relation to gender and Angle's malocclusion classification.

**Materials and Method:** This is a retrospective observational study. It was conducted in Orthodontics Department of Nishtar Institute of Dentistry, from 2015 to 2020. In this study records from 1032 patients who reported to orthodontic department in Nishtar institute of dentistry Multan for fixed orthodontic treatment were taken. For data registration SPSS 20 (IBM Chicago Illinois) was used. Frequency of extractions with regards to gender, skeletal pattern and types of extraction pattern was determined. In order to assess the association among variables Chi square test was applied and a P value of less than 0.05 was considered as significant.

**Result:** In respect of extraction group, 222 (41.3%) were males and 316 (58.7%) were female and whereas in non-extraction group, 83 (16.8%) were males and 411 (83.2%) were females. The difference was statistically significant ( $p < 0.001$ ). The frequency of extraction in reference to Angle's classification was analyzed, and no significant difference was found ( $p = 0.992$ ). Frequency of extraction was highest in class-II division-I malocclusion, and the lowest frequency of orthodontic tooth extraction was seen in class-II division-II malocclusion.

**Conclusion:** It can be concluded from the results of our study that females had higher frequency of extractions as compared to males. Similarly, class II malocclusion patients had highest frequency while lowest frequency was in Class I malocclusions.

**KEYWORDS:** Dentistry, Extraction, Frequency, Malocclusion, Orthodontics, Skeletal, Teeth

## INTRODUCTION

When the 20th century started Orthodontics was first recognized as a science. The removal or extraction of teeth destroys the ideal esthetics and occlusion, which was the base of orthodontic treatment plans. Edward Hartley Angle and his followers were not supporters of extraction due to this reason<sup>1</sup>. Extreme dental or maxillary protrusion leading to facial deformities could be corrected by dental extraction was supported by Calvin Case who was a strong opponent of the Angle.

Case reported that the percentage of cases required extraction for malocclusion was 3%, 5%, and 0% for Class I, II, and III, respectively. Among all the cases of malocclusions treated, extraction was necessary for 6-7% of cases<sup>2,3</sup>.

Charles tweed, a follower of Angle, after his death in 1930 re-treated the cases that presented relapses who did not undergo extraction process after evaluating them. After analyzing and comparing the results with

Angle's theory, he stated that 80% of patients did not attained stability, facial esthetics, periodontal health or functional objectives. Due to these outcomes Tweed supported the process of extraction for correction of facial deformities and providing greater stability after treatment<sup>4</sup>. Extraction was introduced in the dental field by the end of 1940 after these findings as the concepts of orthodontics were changed<sup>5</sup>. In United States (US) for orthodontic purpose dental extraction started to be used frequently during 1950 to 1960. About half of the patients (50%) had dental extractions (mostly first premolars) as orthodontic treatment<sup>6</sup>.

Orthodontists who did not exploited the Edgewise philosophy implemented Begg's technique and included extractions in the treatment strategies, due to great acceptance of this technique after 1960. The use of extraction process was on highest level while after that it started to decline considerably<sup>5</sup>. As well-known, use of extraction for orthodontic purpose has been discussed from a long time ago (for more than 100 years). Criteria such as cast analysis and the teeth location in the bone base were not enough to guide orthodontic extractions in present days. For better outcomes, accuracy of diagnosis and effective treatment strategies, use of extraction process (in borderline cases) required analysis of dental, facial and skeletal features. The factors included in making the decision for selection of extraction process for purpose of orthodontics include following; cooperation of patient, facial profile and age of skeleton, any kind of dental asymmetry and anteroposterior relations and presence of pathology<sup>7,8</sup>.

This treatment planning was also affected by the factor of esthetic facial aging related concerns for orthodontic nowadays, while studies suggested that use of dental extraction does not affect the soft facial tissues with time, along with the fact that facial height was also not influenced after extraction<sup>9</sup>. Methods such as interproximal reduction, functional appliances, thermoplastic aligners, temporary anchorage devices and self-ligated brackets as well as development of bonding in Orthodontics also affected the orthodontic treatment plans<sup>10</sup>. For facial features improvements and to gain stability in results, extraction remained a part of treatment plan for orthodontics despite the expansion and space creation in the arches<sup>10</sup>. As mentioned earlier along with many studies also revealed that the first premolars were the major indication for orthodontic extraction<sup>6</sup>. These teeth were mostly selected for extraction because of their proximity to the front and posterior teeth, their position in the arch (central

position) facilitating the adjustment of crowding, dentoalveolar protrusion and midline deviations.

Our study intended specifically to the cases treated with dental extraction, in the Orthodontics Department of Nishtar Institute of Dentistry, from 2015 to 2020, for mainly analyzing the frequency of use of orthodontic extractions after evaluating the changes in the use of extraction in past years. The frequency of extractions was examined in relation to gender and Angle's malocclusion classification.

## MATERIALS AND METHOD

The study was conducted in the Orthodontics Department of Nishtar Institute of Dentistry, from 2015 to 2020. This is a retrospective observational study. In this study records from 1032 patients who reported to orthodontic department in Nishtar institute of dentistry Multan for fixed orthodontic treatment were taken. Author's research was approved by ethics review committee. Sample size was calculated using the reference study conducted by Camila et al<sup>11</sup> where a confidence interval of 95% and hypothesized frequency of extraction i.e. P1 was 47% in all classes. Inclusion criteria for this sample were: History sheets along with clinical records determining treatment plan with regards to extraction or non-extraction, patient with complete permanent dentition excluding wisdom teeth. Exclusion criteria for the sample were patient without proper treatment record showing indecisive plan for extraction or non-extraction, patient having congenitally missing teeth or malformed teeth. For data registration SPSS 20 (IBM Chicago Illinois) was used. Frequency of extractions with regards to gender, skeletal pattern and types of extraction pattern was determined. In order to assess the correlation among variables Chi square test was applied and a P value of less than 0.05 was considered as significant.

## RESULT

Study population comprised of 1032 patients of which 305 (29.6%) males and 727 (70.4%) were females. Total 538 (52.1%) patients were treated with orthodontics extractions and 494 (47.9%) patients were treated with non-extraction treatment method. On Angle's classification, 183 (17.7%) patients were in class-I, 488 (47.3%) were in Class-II division-I, 121 (11.7%) were in Class-II division-II, and 240 (23.3%) were in Class-III. Age at the start of the treatment ranged from 9 to 36 years, with mean age being 18.6 years. Most frequently occurring age was 14 years, with almost 90% of the patients ranging from 11 to 28 years.

**Table-1**  
**Patients' characteristics**

Variable	Value
Gender, N (%)	
Male	305 (29.6%)
Female	727 (70.4%)
Treatment option, N (%)	
Orthodontic extraction	538 (52.1%)
Non-extraction methods	494 (47.9%)
Angle's classification, N (%)	
Class-I	183 (17.7%)
Class-II division-I	488 (47.3%)
Class-II division-II	121 (11.7%)
Class-III	240 (23.3%)
Age, Mean (min-max)	18.6 (9-36)

In respect of extraction group, 222 (41.3%) were males and 316 (58.7%) were female and whereas in non-extraction group, 83 (16.8%) were males and 411 (83.2%) were females. The difference was statistically significant ( $p < 0.001$ ). The frequency of extraction in reference to Angle's classification was analyzed, and no significant difference was found ( $p = 0.992$ ). Frequency of extraction was highest in class-II division-I malocclusion, and the lowest frequency of orthodontic tooth extraction was seen in class-II division-II malocclusion.

**Table-2**

**Comparison between extraction and non-extraction group**

Variable	Extraction (N=538)	Non-extraction (N=494)	p-value
Gender, N (%)			
Male	222 (41.3%)	83 (16.8%)	<0.001
Female	316 (58.7%)	411 (83.2%)	
Angle's classification, N (%)			
Class-I	97 (18.0%)	86 (17.4%)	0.992
Class-II division-I	254 (47.2%)	234 (47.4%)	
Class-II division-II	62 (11.5%)	59 (11.9%)	
Class-III	125 (23.2%)	115 (23.3%)	

Present study also analyzed according to angles classification the most common orthodontic tooth extraction combination was all permanent first

premolars followed by upper first premolars. All permanent first premolars tooth extraction was most common in Class I and Class II div I malocclusion, respectively.

**DISCUSSION**

For the purpose of evaluation of the frequency of extraction as orthodontic treatment plan, literature included studies taken place in over 20 years of period. The outcomes of current study suggested that the frequency of extraction method has been reduced in the past 5 years from 2015 to 2020. Same pattern of reduction in frequency of extraction over the time was also found by the studies by Proffit,<sup>5</sup> Moreirá<sup>2</sup> and Janson<sup>13</sup> in a period of 40 years, 30 years, and 35 years respectively. As viewed by Proffit<sup>5</sup> in his study, due to the reason of advancing esthetic standards and number of recourses available by the orthodontists for treating the malocclusion (expander systems, distalisers devices, functional and orthopedic appliances, temporary anchorage devices) and an increased frequency of interproximal reduction were the factors relating to the lower the frequency of extraction method in orthodontics.

According to the earlier studies through 1970, other factors including the decline in the use of extraction method were introduction of bonded brackets technique, as an alternative of banding of all teeth. Furthermore Proffit et al.<sup>5</sup> showed that stability among patients who underwent extractions was not seen in studies with long-term follow up. This also helped in reduction of incidence of extraction treatment in patients.

In our study we found that first premolars are most commonly involved in tooth extraction which is supported by many past studies<sup>6, 12, 14</sup>. The location of such elements in dental arch is the reason for this finding. It also helps the correction of space issues and midline deviations in incisor region<sup>15, 16</sup>. The most important factor to be considered during extraction is the position of teeth being extracted in the dental arch and other factors include developmental changes, presence of cavities, ectopic teeth, poor restoration quality or excessive restorations and endodontic treatment<sup>15</sup>. When malocclusion classes were analyzed for frequency of extractions as per Angle's classification the findings of a previous study showed no statistical difference however the in our study the frequency of extraction was lowest in Class I malocclusions. In contrast study by Moreira et al. 12 showed that greatest frequency of extraction was in Class I malocclusion patients who were treated with extractions (68.6%).

The indications for extractions as proposed by Calvin Case were very few as compared to the indications that are presented in current era. Calvin Case in his study showed very few indications among patients with Class III malocclusions while in our study 23.3% of the patients with malocclusion Class III underwent extraction. In our study extraction frequency was higher among females as compared to males. This contrasts with most of the recent studies<sup>12, 17</sup>. In study by Peck et al.<sup>18</sup> the frequency of extraction was similar to the findings of our study i.e. it was higher among females as compared to the males. Despite the large sample size this is an observational study which does not represent the exact reasons of extraction in various skeletal patterns in orthodontics. In future experimental

and interventional studies are required to identify the factors of orthodontic extraction in patients of various skeletal patterns. Another limitation of the study is that it is registry based which has the probability of the bias as well.

## CONCLUSION

It can be concluded from the results of our study that males had higher frequency of extractions as compared to females. Similarly, class II malocclusion patients had highest frequency while lowest frequency was in Class I malocclusions.



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